Two Fossil Hymenoptera from Florissant (Vespidae, Megachilidae).

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The wasp and bee now described, from the Miocene shales of Florissant, Colorado, belong to the Colorado Museum of Natural History, and were kindly placed in my hands for study by Director J. D. Figgins.

Palaeovespa relecta new species.

Length 17.5 mm.; anterior wing 10.7 mm.; first discoidal cell slightly over 5 mm.; length of marginal cell 3 mm.; prothoracic lobes not striate; abdomen broad at base as in *Vespa*. Head and thorax black; antennae stout, ferruginous, dark at extreme base; first two segments of abdomen pallid, with small lateral dark markings; segments 3 to 5 with broad dark bands, about as broad as the intervals between them, each with a broadly rounded lobiform extension posteriorly on each side, and at posterior middle a very minute point easily overlooked; apex dark. Wings clear, suffusedly somewhat dusky along upper margin; nervures light ferruginous; marginal cell produced and narrowly pointed as usual in genus; end of first discoidal not more oblique than in *Vespula;* second recurrent nervure ending much more than half way from first recurrent to end of second submarginal cell.

The following measurements are in microns: Second submarginal cell on first discoidal, 208, on second (third of many authors) discoidal, 560, from second recurrent to end, 320; width (depth) of marginal cell, 690; second submarginal on marginal, 384; third submarginal on marginal, 720.

This is an extremely interesting species, for several reasons. Among the species of *Palaeovespa*, it falls next to *P. gillettei* Ckll., but that has the abdomen black, with narrow light sutural bands, and differs in various details. The abdominal bands of *P. relecta* are lobed posteriorly as in the living *Vespula consobrina* Sauss.; in *V. germanica* Fabr. the lobes have become elongated and basally constricted, or cephaliform; in *V. vulgaris* L. they have become spots. The posterior median point so conspicuously developed in *Vespula* is a minute dentiform process on the hind margin of the bands of *P. relecta*. The slender apex of the marginal cell, and the position of the second recurrent nervure, place *P. relecta* in *Palaeovespa*, but *Vespula* is divided into two groups according to the position of the second recurrent. In true *Vespula*, with short malar space, the second recurrent ends about midway between the first and the end of the second submarginal cell. I have examined *V. occidentalis* Cress. (San Ignacio, New Mexico, at flowers of

plum, May 4.). *V. germanica* Fabr. (The Mount, Funchal, Madeira, Dec. 28), *V. vulgaris* L. (Winfrith, Dorset, England, Oct. 11), and *V. consobrina* Sauss. (Buford, Colo.). In Rohwer's *Dolichovespula*, which may be taken as a genus, not only is the malar space long, but the second recurrent is more than twice as far from the end of the second submarginal as from the first recurrent. I have before me *D. maculata* L. (Buford, Colo.), and *D. diabolica* Sauss. (Boulder, Colo., and Las Vegas, N. M.). With these structural differences, go others in nesting habits. In respect to the position of the recurrent nervures, *Dolichovespula* stands midway between *Vespula* and *Palaeovespa*, and therefore presumably represents the latest stage of evolution.

Heriades mersatus new species.

Length 6 mm.; anterior wing 3.8 mm.; base to stigma 2.2 mm.; width of head 1.5 mm., of abdomen not quite 2; length of abdomen 2.7 mm. Head and thorax black; abdomen pale reddish, darkened at apex and base; legs pale ferruginous; wings clear, nervures ferruginous; antennae stout; head and thorax closely and strongly punctured, as in modern *Heriades*, the punctures of thorax about 24 microns in diameter.

The following measurements are in microns: width of flagellum, 160; width (depth) of marginal cell, 304; straight section of basal nervure not greatly shorter than the curved (lower) section, the latter 416; length of marginal cell, 976; first intercubitus to end of marginal cell, 800; greatest length (diagonal) of first submarginal cell, 704; length of second submarginal, 624; second submarginal on marginal, 272; second recurrent before end of bulging second submarginal about 50 (as in the living *H. truncorum*, but in the fossil *H. halictinus* Ckll. the nervure is at end of cell). The first recurrent nervure joins second submarginal cell at distance from its base equal to about half intercubitus, as in *H. halictinus*. The nervulus, placed typically for the genus, is a very little basad of the basal nervure, and slightly arched outward. The first discoidal cell is 944 long.

Nearest to *H. halictinus* Ckll., among the Florissant fossils, but differently colored, and with different wing measurements. The lower section of basal nervure is not greatly curved.

This makes the sixth fossil *Heriades* from Florissant, while in the modern fauna of Colorado we know only three species. In Miocene times it appears that *Heriades* was prolific in species in the Rocky Mountain country, just as it is in South Africa today. Why it has become limited to a few types in modern Colorado we cannot conjecture, unless it may be that suitable nesting places are now less frequently available.